A Very Short Introduction

牛津通识读本

简明逻辑学

Logic

[英国] 格雷厄姆·普里斯特 / 著
史正永 韩守利 / 译

译林出版社

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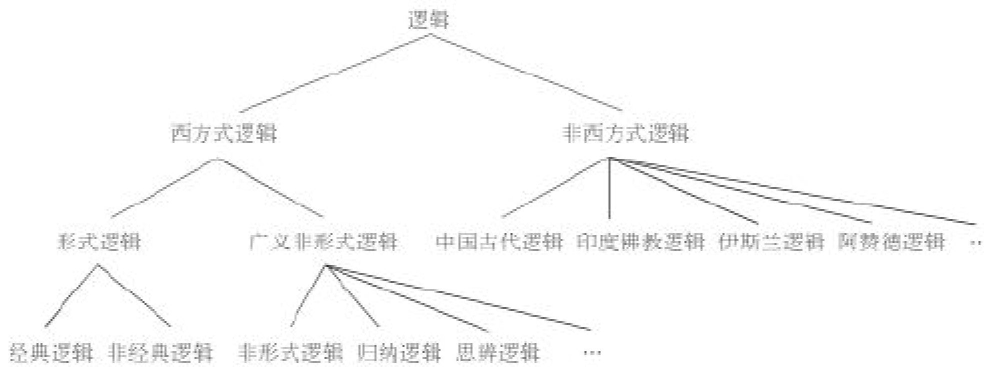
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女王很富有。

要么女王很富有，要么猪会飞。

要么女王很富有，要么猪会飞。　　女王不富有。

猪会飞。

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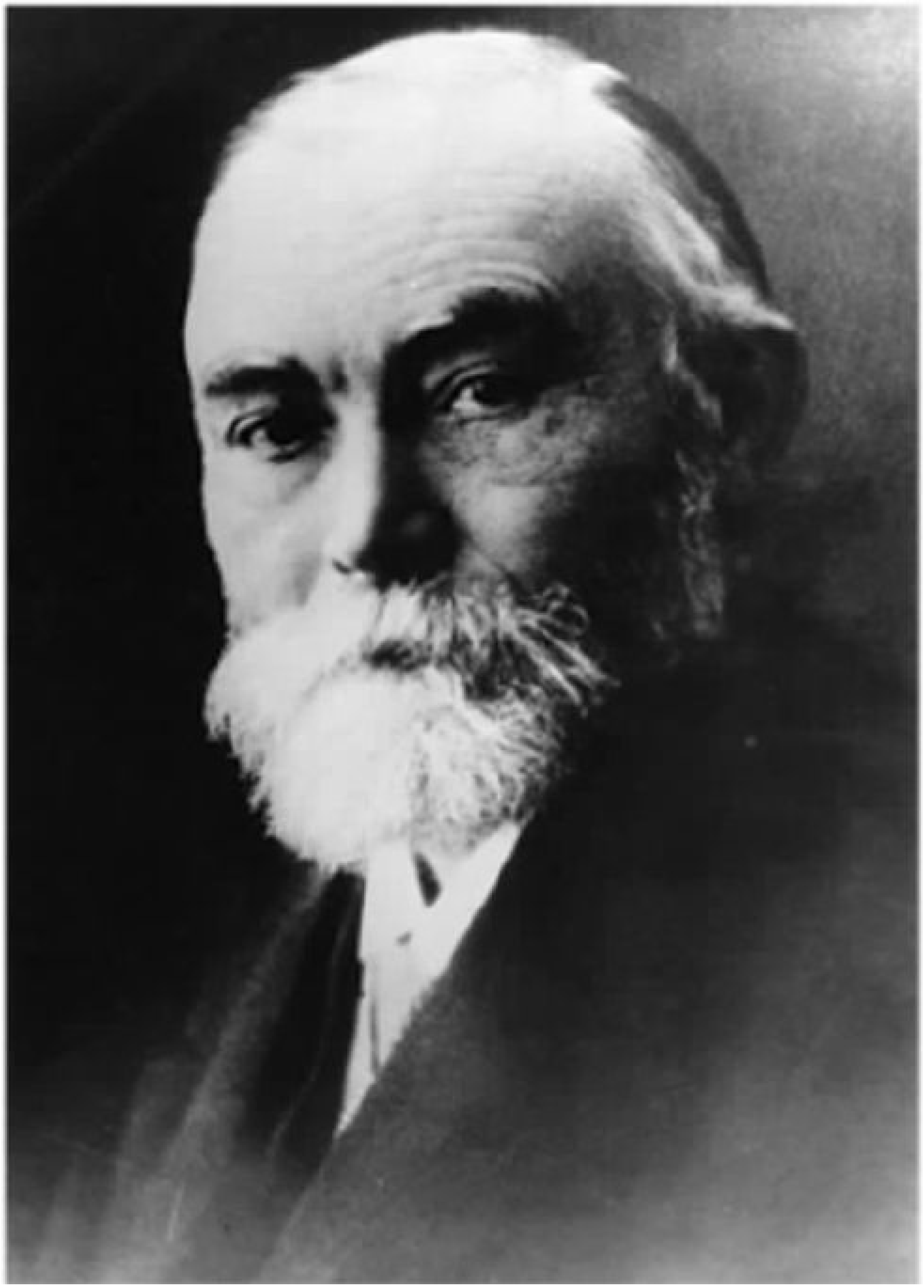
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我们如何知道——在某些内容之间的——表示「a为真」或者「b为真」的规则，其本质是否与句子之间的关系相同呢？当我们说出像这样的句子，我们即可以a V b的形式表达出这种概念：



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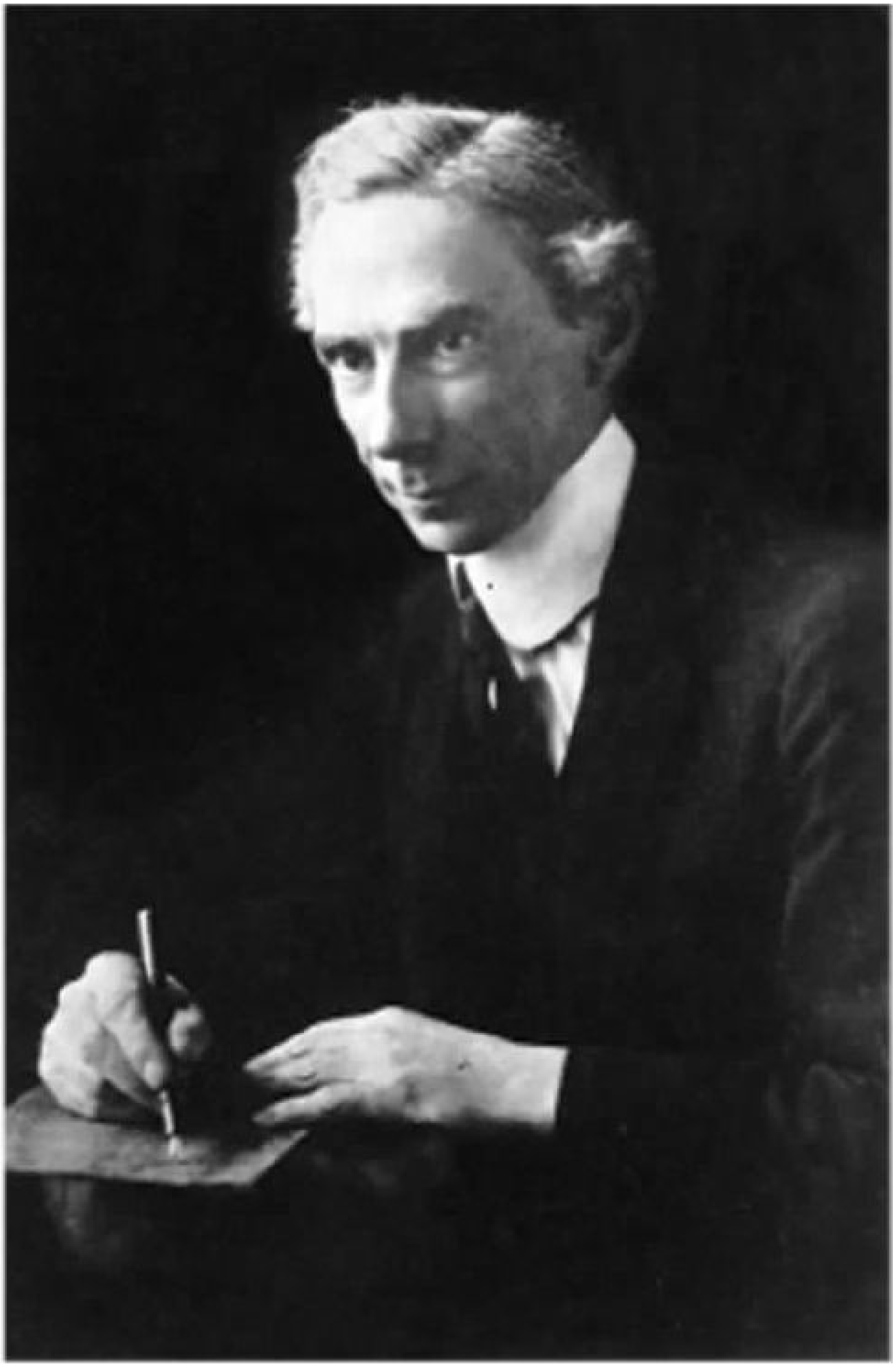
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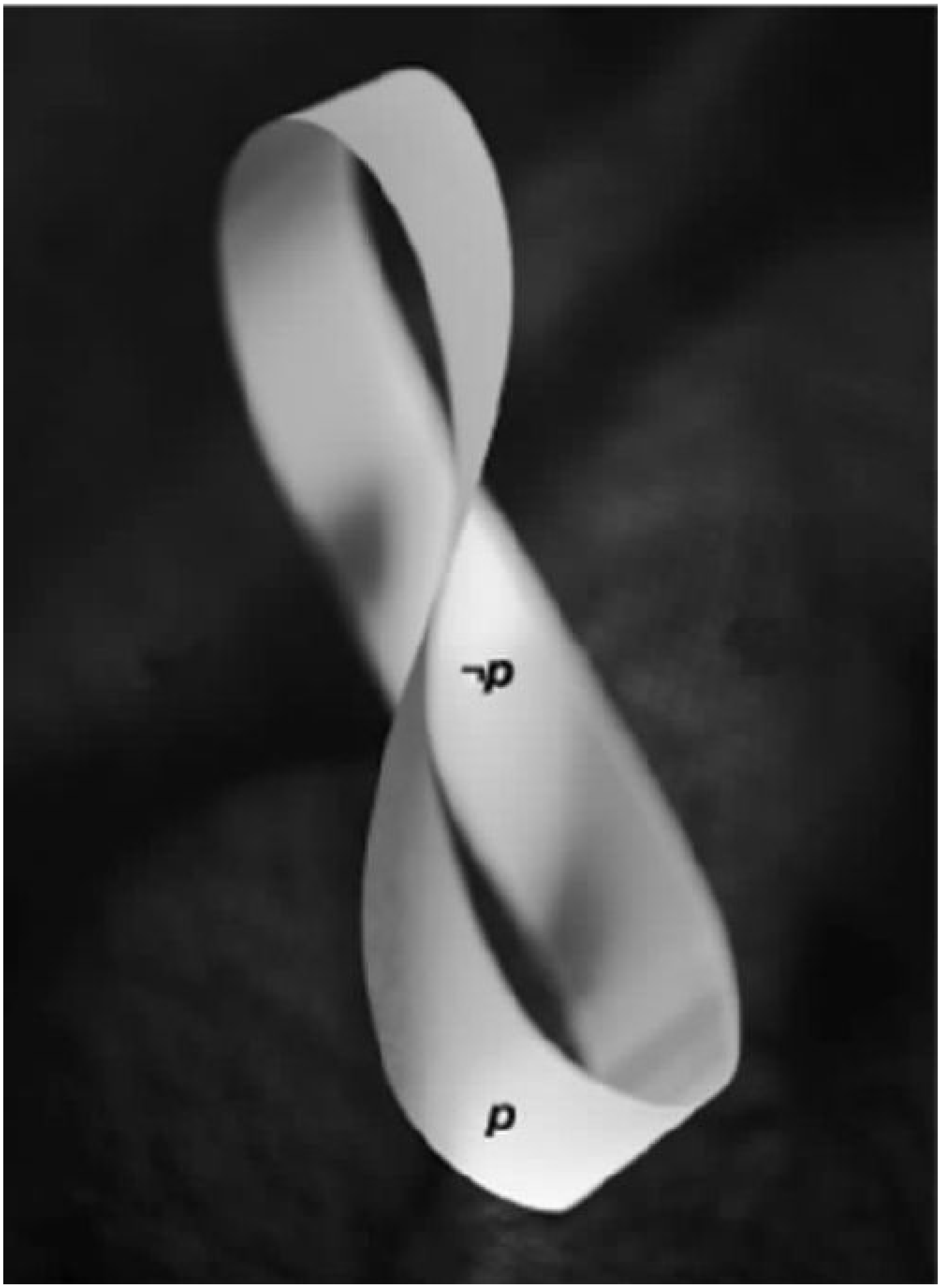
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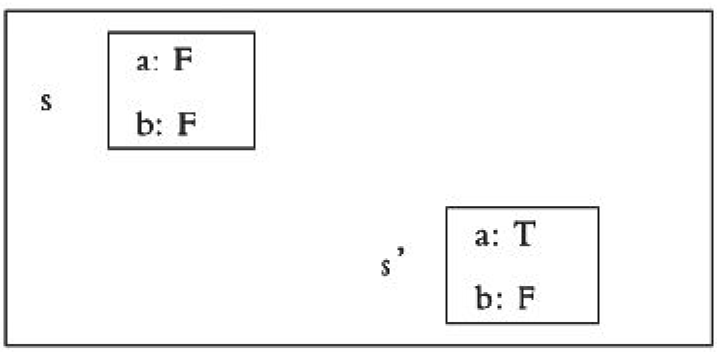
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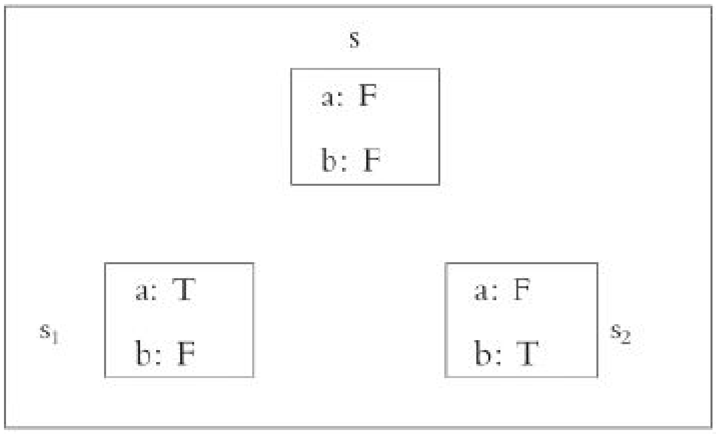
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$$\frac{\Box a \quad \Box b}{\Box (a \,\&\, b)}$$

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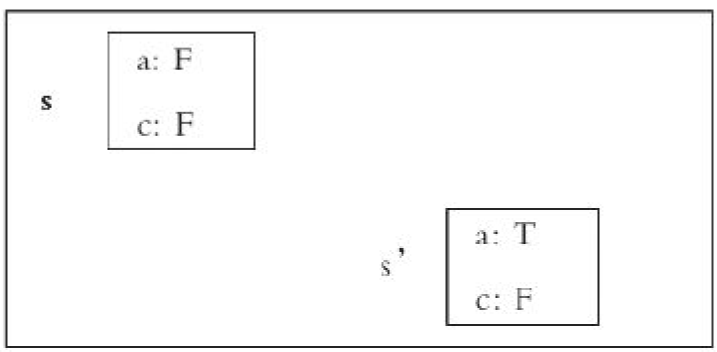
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$$2.\quad \frac{a \rightarrow c}{(a \ \& \ b) \rightarrow c}$$

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天一直在下雨，这会是真的。
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天在下雨。

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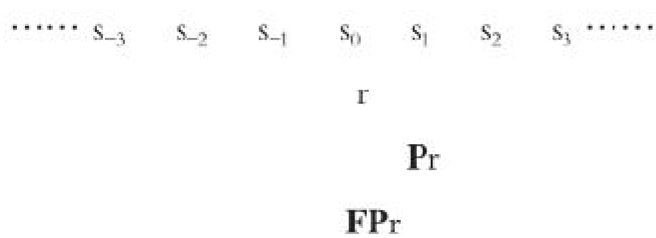
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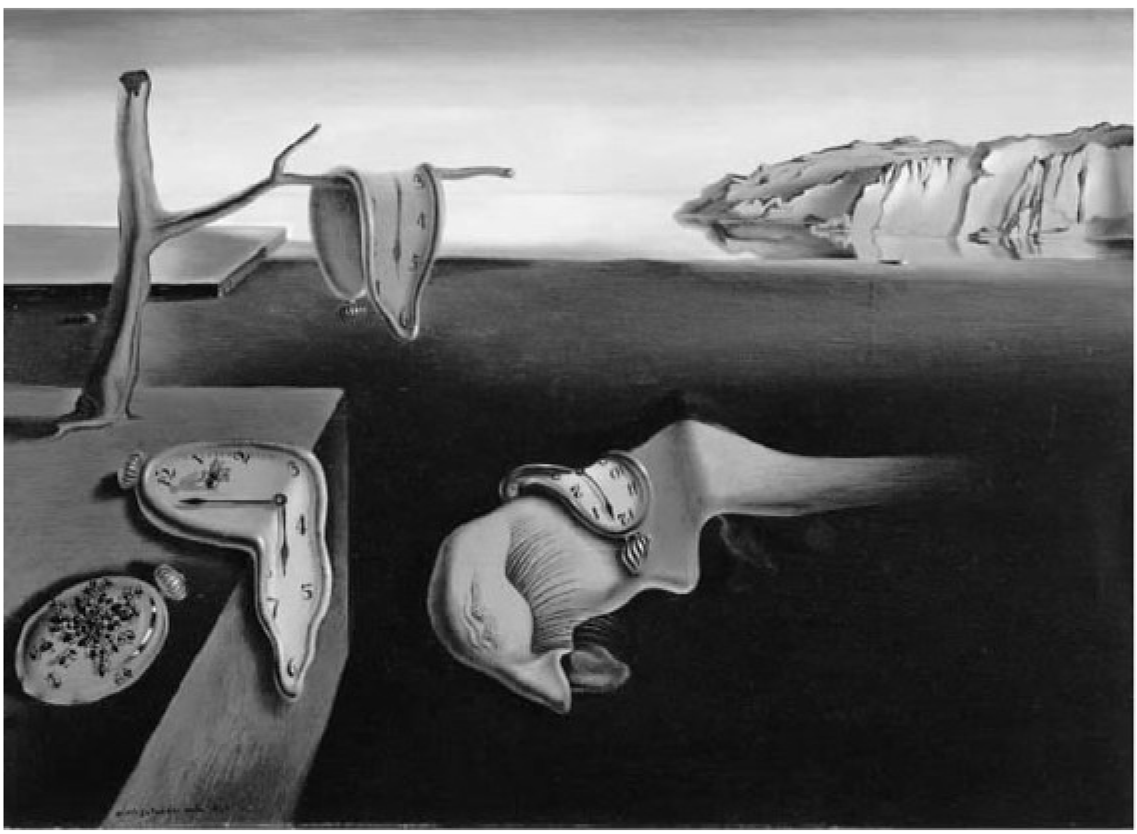
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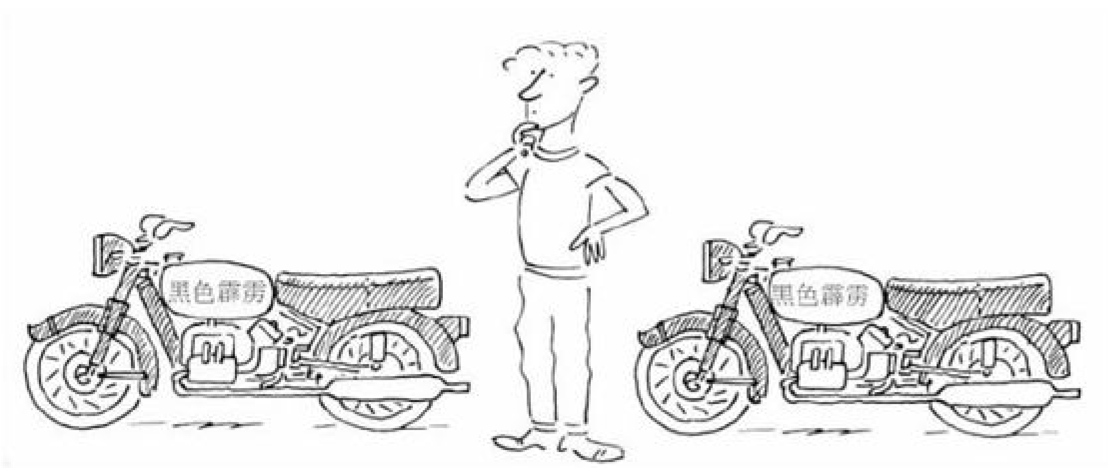
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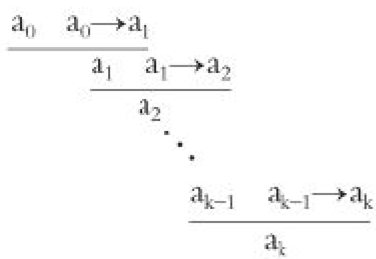
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$|\neg a| = 1 - |a|$

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a	¬a
1	0
0.75	0.25
0.5	0.5
0.25	0.75
0	1

[illegible]

$|a\&b| = \mathrm{Min}(|a|, |b|)$

[illegible]

a & b	1	0.75	0.5	0.25	0
1	1	0.75	0.5	0.25	0
0.75	0.75	0.75	0.5	0.25	0
0.5	0.5	0.5	0.5	0.25	0
0.25	0.25	0.25	**0.25**	0.25	0
0	0	0	0	0	0

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a → b	1	0.75	0.5	0.25	0
1	1	0.75	0.5	0.25	0
0.75	1	1	0.75	0.5	0.25
0.5	1	1	1	0.75	0.5
0.25	1	1	1	1	0.75
0	1	1	1	1	1

a_0	a_1	a_2	a_3	a_4
1	0.75	0.5	0.25	0

$a_0 \to a_1$□□0.75□□□□=1-□1-0.75□□□□$a_1 \to a_2$□□□□□□□□□□□□□
□□□□□□□□$a_n \to a_{n+1}$□□□□□0.75□

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$$\frac{\#\,(w \vee r)}{N} = \frac{\#w}{N} + \frac{\#r}{N} - \frac{\#(w\ \&\ r)}{N}$$

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pr□w V r□= pr□w□+ pr□r□□pr□w&r□

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$$pr(g \mid o) \times \frac{pr(o)}{pr(g)} > pr(\neg g \mid o) \times \frac{pr(o)}{pr(\neg g)}$$

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$$\frac{pr(g \mid o)}{pr(g)} > \frac{pr(\neg g \mid o)}{pr(\neg g)}$$

[illegible]

$$5. \quad \frac{pr(g \mid o)}{pr(\neg g \mid o)} > \frac{pr(g)}{pr(\neg g)}$$

[illegible] 2 [illegible]

$$\frac{pr(g \mid o)}{pr(\neg g \mid o)} > 1$$

[illegible] 5 [illegible] $\frac{pr(g)}{pr(\neg g)} \geq 1$ [illegible]

$pr(g) \geq pr(\neg g)$

pr [illegible] g [illegible] pr [illegible] g [illegible] g [illegible] g [illegible] o [illegible]

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$$\mathrm{pr}(c \mid f) \times \frac{\mathrm{pr}(f)}{\mathrm{pr}(c)} > \mathrm{pr}(c \mid \neg f) \times \frac{\mathrm{pr}(\neg f)}{\mathrm{pr}(c)}$$

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$$\cdot \ pr(a \mid b) = pr(b \mid a) \times \frac{pr(a)}{pr(b)}$$

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[illegible]0[illegible]

[illegible]

$$0.1\times(-5)+0.9\times10$$

[illegible]

[illegible]

$$pr(o_1)\times V(o_1)+pr(o_2)\times V(o_2)$$

[illegible]

[illegible]

$$0.1 \times 0 + 0.9 \times (-1)$$

	上帝存在	上帝不存在
我相信(b)	$0.1 \backslash +10^2$	$0.9 \backslash -10$
我不相信(¬b)	$0.1 \backslash -10^6$	$0.9 \backslash +10^2$

[illegible]

E□b□=0.1×10^2 + 0.9×□-10□≌0

E□□b□=0.1×□-10^6□+ 0.9×10^2 ≌-10^5

□≌□□“[illegible]”[illegible]

[illegible]-10^6[illegible]-∞[illegible]

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	上帝不存在	上帝存在	阿拉存在	…
没有信仰(n)	0.9\+10^2	0.01\−10^6	0.01\−10^6	…
信仰上帝(g)	0.9\−10	0.01\+10^2	0.01\−10^9	…
信仰阿拉(a)	0.9\−10	0.01\−10^9	0.01\+10^2	…
⋮	⋮	⋮	⋮	

[illegible]

$$E(n) = 0.9\times10^2 + 0.01\times(-10^6) + 0.01\times(-10^6) \backsimeq -2\times10^4$$

$$E(g) = 0.9\times(-10) + 0.01\times10^2 + 0.01\times(-10^9) \backsimeq -10^7$$

$$E(a) = 0.9\times(-10) + 0.01\times(-10^9) + 0.01\times10^2 \backsimeq -10^7$$

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[illegible] 1/2 [illegible] 1-1/2 [illegible] 3/4 [illegible] $1-1/2^2$ [illegible]

	逃离地狱	待在地狱
今天抛硬币(d)	$0.5\backslash+10^6$	$0.5\backslash-10^6$
明天抛硬币(m)	$0.75\backslash+10^6$	$0.25\backslash-10^6$

[illegible]

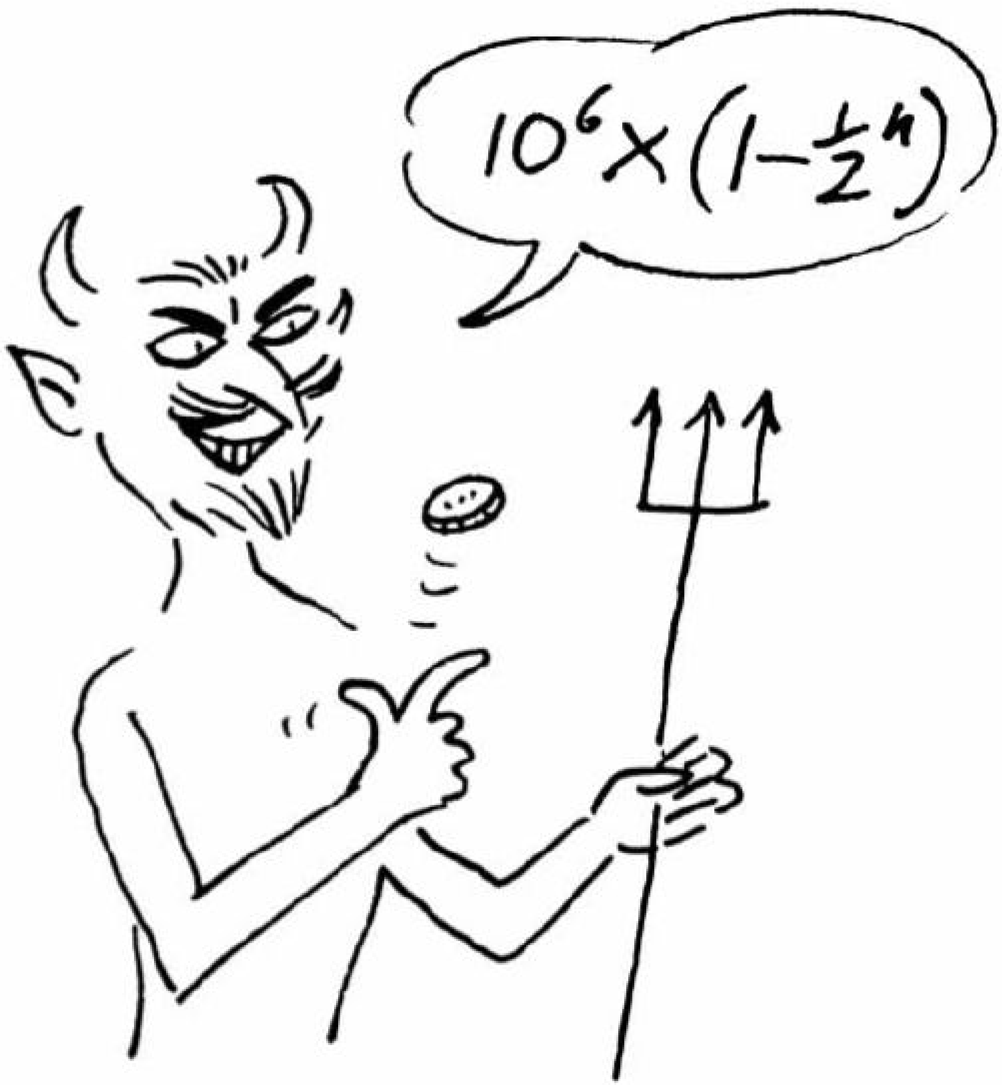
$E(d) = 0.5\times10^{6} + 0.5\times(-10^{6}) = 0$

$E(m) = 0.75\times10^{6} + 0.25\times(-10^{6}) = 0.5\times10^{6}$

[illegible]

[illegible]7/8[illegible]$1-1/2^{3}$[illegible]

$1-1/2$, $1-1/2^{2}$, $1-1/2^{3}$, $1-1/2^{4}$ ……$1-1/2^{n}$ ……



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$(1-1/2^{n}) \times 10^{6} + 1/2^{n} \times (-10^{6})$

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·E□a□$= pr$□o_1□$\times V$□o_1□$+ \ldots\ldots + pr$□o_n□$\times V$□o_n□□□□$o_1 \ldots\ldots o_n$□□a□□□□□□□□□□□

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19[illegible]1848——1925[illegible]1872——1970[illegible]20[illegible]

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[illegible]18[illegible]·[illegible]1989[illegible]

[illegible]18[illegible] 20[illegible]1985[illegible]1988[illegible]

[illegible]·[illegible]17[illegible]·[illegible]“[illegible]”[illegible]19[illegible]“[illegible]”[illegible]20[illegible]1964[illegible]

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[illegible] 0.5 [illegible]

[illegible] 10 [illegible] 1——10 [illegible]

	1	2	3	4	5	6	7	8	9	10
高	√		√		√				√	
富有	√		√		√		√	√		
快乐	√	√		√	√			√	√	

[illegible] r [illegible] r [illegible] r [illegible]

[illegible] A [illegible] B [illegible] 90 [illegible] A [illegible] 10 [illegible] B [illegible] A [illegible] B [illegible]

1. [illegible] B [illegible] 100 [illegible] B [illegible]

2. [illegible] B [illegible] B [illegible]

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[illegible]……[illegible]

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符号	意义	名称
T	（在某一情形下是）真的	真值
F	（在某一情形下是）假的	

∨	要么……要么……	析取(命题)
&	……和……	合取(命题)
¬	并非……	否定(命题)
∃x	某个事物 x,x 具有……特性	特称量词
∀x	每个事物 x,x 具有……特性	全称量词
ιx	某个事物 x,它……	摹状词算子
□	情况必然是……	模态算子
◇	情况也许是……	
→	如果……那么……	条件句
⊃	不是两者都(…… 和……不)	推论条件句
P	过去曾是……	时态算子
F	将来是……	
H	过去一直是……	
G	将来一直是……	
=	……与……是相同的事物	身份
$<$	……小于……	
≤	……小于或等于 ……	
|…|	……的真值的绝对值	
Max	……与……中较大的	
Min	……与……中较小的	
pr	……的概率	
pr(… | …)	在……条件下……的概率	条件概率
E	……情况的期望值	
V	……情况的值	
≌	……约等于……	

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A

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